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Author(s)	So, KF
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Promotion of Neurogenesis and Preservation of Dendrites by Anti-Aging Lycium Barbarum (Wolfberry) in Experimental Depression

Kwok Fai So, Ph.D

Department of Anatomy, University of Hong Kong

Lycium barbarum (Wolfberry) is a traditional Chinese medicine herb which can be used for both disease treatment and as a functional food. For a long time, it is believed that Wolfberry has anti-aging properties but there is little scientific evidence to support this concept. Depression is a severe mental disorder related to aging and neurodegeneration. The current view on depression is related to the monoamine hypothesis. Depression is due to a deficiency in one or another of three monoamines: serotonin (5-HT), noradrenalin and /or dopamine. More recently, two new hypotheses are being proposed. 1. Neurogenesis hypothesis: decrease in the synthesis of new neurons in the adult hippocampus might be linked to depressive disorders (Kempermann and Kronenberg, 2003: Biol. Psychiatry). 2. Neuroplasticity hypothesis: Morphologic changes in the hippocampus of depressed patients reflecting alterations at the level of granule cells and the complexity of dendritic processes. We will provide evidence on how Wolfberry can be effective in reducing depressive-like behaviour in rats via the neurogenesis and dendritic plasticity mechanisms.

Hypercotisolemia is a common pathological situation which can lead to deficits in cognition and emotion, thus many scientists adopt injection of corticosterone (CORT) to induce experimental depression. Previous data in our lab showed that different doses of corticosterone injection lead to differential outcome of behavioral performance. Exercise, an effective strategy known to rescue cognitive and emotional deficits, was able to restore cognitive and emotional deficits in an experimental hypercortisolemia induced by 40 mg/kg, but not 50 mg/kg corticosterone (CORT) injection. At present study, we wanted to investigate whether polysaccharides of Wolfberry (also known as *Lycium Barbarum*) (LBP) could rescue those behavior impairments in the experimental hypercortisolemia induced by 40 mg/kg and 50 mg/kg corticosterone injection. All experimental animals were divided into four groups: PBS feeding group (PBS group), PBS feeding plus CORT injection group (PBS+C group), LBP feeding group (LBP group), and LBP feeding plus CORT injection group (LBP+C group). Our results showed that LBP feeding can restore depression-like behavior caused by 40mg/kg and 50 mg/kg CORT injection. Additionally, escape latency in the Morris Water Maze on day 2 were significantly decreased in the LBP+C group, when compared to those in PBS+C group. Following 40mg/kg CORT injection, BrdU positive cell number in the hippocampus significantly increased in the LBP+C group when compared to that in the PBS+C group. In 50mg/kg CORT injection, the BrdU positive cell number significantly decreased to 44.4% and 55.8% in the PBS+C and the LBP+C group, when compared to the PBS group, respectively. No difference were observed between PBS+C and LBP+C group, but the ratio of BrdU/Doublecortin double positive cell number to BrdU positive cell number in hippocampus was significantly increased in the LBP+C group, when compared to those in the PBS+C group. Furthermore, Western bloting data showed that the amount of postsynaptic density protein-95 significantly increased in the LBP+C group, when compared to those in the PBS+C group. In conclusion, our data indicate that LBP treatment is beneficial to those cognitive impairment and depressive behavior in an experimental hypercortisolemia induced by 40 mg/kg and 50 mg/kg

CORT. Wolfberry might be considered as a novel treatment approach for depression in clinical situation.